UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

Date: April 19, 2017

To: Jenny Wu, EPA Region 10, Office of Water and Watersheds

From: Andrea LaTier, EPA Region 10, Office of Environmental Review and Assessment

Subject: Comments on the Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation - Leavenworth National Fish Hatchery Spring Chinook salmon Program
NMFS Consultation Number: WCR-2015-00969

A. GENERAL COMMENTS:

EPA fails to see where NMFS has provided the technical justification to demonstrate adverse effects in this draft Biological Opinion and, in particular, adverse effects that rise to the level of take. The potential impacts from the discharge of phosphorus at the interim level are discussed, and there are numerous statements on the magnitude of effects on water quality and pH; but the integration of this information with the "negative effects" on listed salmonids does not support the determination of "take".

On the contrary, the draft Biological Opinion speaks to the conservative analysis that was conducted, which considers: (1) the interim total phosphorus limit that must be met at the end of the pipe (without considering dilution); (2) integration of abatement ponds, which were not considered in the establishment of the interim limit for phosphorus; (3) the effect of dilution on the level of phosphorus; (4) additional flows (up to 50 cfs) from the Snow/Nada Lakes supplementation as compared to previous operations; (5) the 26% reduction in the Chinook salmon hatchery program that results in the use of less feed; and (6) using reduced phosphorus feed (approximately 30% in phosphorus) at critical time periods.

There is only mention of "negative effects" in this draft Biological Opinion, but they are not borne out in the presentation of studies documenting the effect of pH on salmonids. The studies cited in the opinion do not demonstrate mortality in rainbow trout until the pH reaches 10.5; sublethal effects are reported at a pH of 9.4 but only after 144 days of exposure (Table 1 and 2 prepared by EPA).

Furthermore, it is not clear in the use of the term "negative effects" if it relates to significant adverse effects. Nowhere does NMFS use the term "adverse effects" (except in essential fish habitat) nor does NMFS discuss how "negative effects" are presented or manifested and how they rise to the level of "take" (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture,

or collect, or to attempt to engage in any such conduct). In many instances the negative effects are followed by statements such as "though they are likely to be limited" or "are likely to be small in scale"; this speaks to the magnitude of effect, and it would be helpful for NMFS to state whether these effects are significant and exactly why they are significant in order to support the take statement.

EPA does not agree with the conclusion made in the draft Biological Opinion that EPA's action results in a "take." In fact, there are numerous statements made throughout the opinion that appear to directly contradict this determination, as well. The following ten items excerpted from the draft Biological Opinion provide examples of how the opinion does not demonstrate a clear determination of an "adverse effect," nor evidence of a "take" associated with EPA's action:

1. **Page 104, Table 16**: "Hatchery effluent may affect water quality ***but the effects are short term and transitory.***" [emphasis added]

2. **Page 140, Line 29**: "NMFS assumes that the effect of phosphorus from current hatchery operations is similar to the effect of operating at maximum limit allowed under the NPDES permit because the amount of phosphorus in current effluent is unknown and is likely to be equal or less than the amount indicated in the 2006-2011 dataset used by the EPA to set the interim limit (see below for further discussion). NMFS believes this is likely to be a conservative approach because, as discussed below, ***the actual operation is likely to have less severe effects, if any, on ESA-listed species than what is analyzed.***" [emphasis added]

3. **Page 141, Line 20**: "It is likely that any discharge ***would dilute quickly within the abatement ponds, and any detectable difference would be localized and small.*** In the summer, return water from the abatement ponds is likely warmer than water in Icicle Creek due to solar heating over the larger surface area (Hall and Kelly-Ringel 2011), but flow contributions are minimal. ***The spillway pool provides a deep-water refugia with cooler temperatures than other downstream areas of Icicle Creek*** *(Kelly-Ringel 2007)* ***and would help minimize effects on ESA-listed species during minimum flows that occur in the summer months***." [emphasis added]

4. **Page 142, Line 4**: "The total facility discharges proportionally small volumes of water with waste (predominantly biological waste) into a larger water body***, which results in temporary, very low or undetectable levels of contaminants.*** General effects of various biological waste in hatchery effluent are summarized in (NMFS 2004c), though the ***biological waste is not likely to have a detectable effect on listed species because of the use of the abatement pond that reduces the biological waste, as well as the small volume of waste compared to the stream flow***. For example, the phosphorus limits summarized in Table 24 are an end-of-the pipe limit, meaning that the ***limit is imposed on the concentration of pollutants at the moment the effluent leaves the facility and***

that the effluent will further be diluted the moment it enters Icicle Creek." [emphasis added]

5. **Page 143, Lines 1-16**: "However, NMFS notes that the current operation of the ***hatchery is likely to be producing less phosphorus in its effluent than the maximum allowed under the interim limits, and, therefore, is likely to have less severe effects on ESA-listed species than what is analyzed below for three reasons.*** First, the hatchery reduced its spring Chinook salmon production in 2010 from 1.6 million juveniles to 1.2 million juveniles (25% reduction), resulting in less feed used (and less phosphorus in the effluent) towards the end of the dataset used to calculate the interim limit. Second, the hatchery built a second abatement pond in 2010, which became operational (and likely started to reduce the phosphorus in the effluent) in 2011, so the dataset used to calculate the interim limit only takes partial account for effect of abatement pond. Third, the amount of phosphorus in the effluent is likely to vary throughout the year because the amount and type of feed (primary source of phosphorus in the effluent) used in the hatchery could vary throughout the year (Table 25)(USFWS 2011; Table 18); that is, ***while the maximum interim limit would apply for all parts of the year under the permit, feed usage outside the time of most feed used (e.g., April, August) would, in reality, be lower, and therefore the hatchery would likely be putting out less phosphorus in the effluent during times of less feed used***, as described in (USFWS 2011; Table 18)." [emphasis added]

6. **Page 144, Lines 9-14**: "Although the maximum phosphorus interim limit allowed under the NPDES permit would be 3.1 kg/day—twice that under the 2002 study—the proposed action also includes an addition of up to 50 cfs in Icicle Creek during the critical, low flow months, which increases the dilution rate over that taking place during the 2002 study. ***Therefore, we note that the effluent with phosphorus loading in accordance with the interim limit is not likely to cause a pH that is substantially higher than the pH detected in the 2002 study***…" [emphasis added]

7. **Page 144, lines 25-29:** "Until the monitoring requirement under the NPDES permit is implemented, we would expect the phosphorus in the effluent to remain the same as current operations and under the interim limit if the amount of feed used is about the same because feed is the primary driver for phosphorus loading in the effluent. ***Thus, we consider the amount of feed to represent a consistent proportional amount of phosphorus in the effluent until the monitoring is implemented.***" [emphasis added; see also Item #5]

8. **Page 147, Line 4**: "NMFS assumes that the effect of phosphorus from current hatchery operations is similar to the maximum limit allowed under the NPDES permit because the amount of phosphorus in current effluent is unknown***. However, as discussed above, the actual operation is likely to have less severe effects, if any, on ESA-listed species*** than what is analyzed above." [emphasis added]

9. **Page 182, Line 1**: "The effluent from current operation and operation under the NPDES permit interim limit may also have minimal negative effect on spring Chinook salmon adults and juveniles because the phosphorus loading may cause temporary sublethal effects in the lower portion of Icicle Creek (up to 2.8 RM) if the pH rises to above 9. However, ***the temporary nature of the effect, the small amount of affected portion of Icicle Creek, the likelihood that fish could readily swim to area of lower pH, and the added flow during the critical months are likely to keep the negative effects minimal.*** In addition, the proposed action includes hatchery operation that supplements up to 50 cfs during these critical months, reducing the likelihood of increasing the pH in Icicle Creek." [emphasis added]

10. **Page 183, Line 41**: "The effluent from current operation and operation under the NPDES permit interim limit may also have minimal negative effect on steelhead juveniles because the phosphorus loading may cause temporary sublethal effects in the lower portion of Icicle Creek (up to 2.8 RM) if the pH rises to above 9. However, ***the temporary nature of the effect, the fact that only a small distance of Icicle Creek is affected, likelihood of the fish swimming to an area with lower pH, and the added flow during the critical months are likely to keep the negative effects minimal.*** In addition, the proposed action includes hatchery operation that supplements up to 50 cfs during these 1 critical months, reducing the likelihood of increasing the pH in Icicle Creek." [emphasis added]

B. SPECIFIC COMMENTS ON THE DRAFT BIOLOGICAL OPINION:

EPA is also submitting the following comments on the draft Biological Opinion.

1. **Page141, Lines 12- 17:** As currently written, this section leads the reader to assume it is specific to Icicle Creek when, in fact, the "studies" are specific to a hatchery in Oregon as described in other locations within the document (NMFS 2004c). Please re-write to clarify that these studies (in line 14) do not represent the Leavenworth Fish Hatchery and discharge into Icicle Creek.

   Page 144, Lines 21 – 22: Please clarify what is meant by tracking pH based on the discharge of phosphorus. What methods are being used to make assumptions about the relationship between the level of phosphorus and pH? Since the intermediary step between the effects of phosphorus on pH is plant (algae) growth, how is NMFS considering algae growth in its tracking pH based on phosphorus in Icicle Creek? Is there a statistical relationship between these parameters based on the hydrology and/or water chemistry in Icicle Creek that allows NMFS to predict pH based on the level of phosphorus discharged to predict effect on listed salmonids?

2. **Page 144, Line 29**: This sentence appears to contradict the assumptions made in other areas of the draft Biological Opinion. For example, on Page 143 (Lines 4-7) it is stated that the amount of feed used at the Hatchery is expected to be less. Please provide clarification.

3. **Page 145, Line 22**: Please specify what pH is considered "severely alkaline water"?

4. **Page 145, Lines 31-34**: Does NMFS have any data that demonstrates that the pH in Icicle Creek will reach or exceed 9.5 *s.u.*? According to the 2002 pH data in the Department of Ecology's EIM database the highest measured pH was 8.4 *s.u.*[1] (see Figure 1, below). EPA's recent modeling showed that the peak pH at the mouth of Icicle Creek was modeled to be 9.05 *s.u.* during the critical low flow period of September 2002, and pH impacts should be even lower in non-critical times of the year when flows are higher. Based on the studies NMFS cited within the draft Biological Opinion, this predicted pH value would not likely result in acute or sublethal effects in adult, juvenile salmonids or embryos.

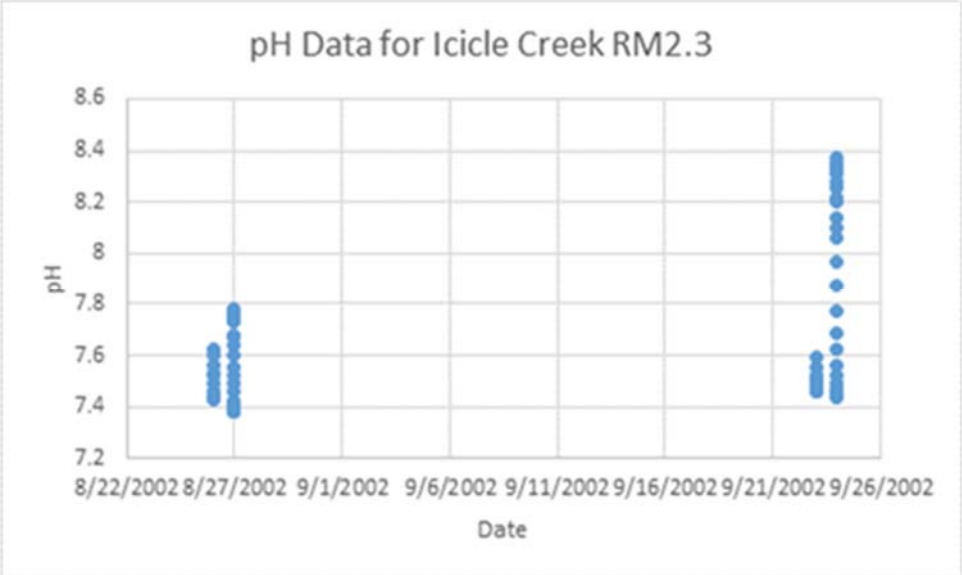

Figure 1: In support of EPA Specific Comment #5, pH data from 2002 monitoring event.

5. **Page 145, Lines 36- 42**: It is unclear why NMFS is discussing aluminum. Does NMFS have reason to believe that it is a pollutant associated with the Hatchery? If there is no direct connection to the Hatchery effluent, EPA recommends removing this discussion to minimize confusion.

[1] https://fortress.wa.gov/ecy/eimreporting/Eim/EIMSearchResults.aspx?ResultType=EIMTabs&LocationName=Icicle+Creek&LocationNameSearchType=Contains

6. **Page 146, Lines 18 – 19**: Specifically, what are the negative effects, and what are they based upon considering that pH is not anticipated to be elevated to the levels described in the studies cited in the biological opinion?

7. **Page 146, Lines 24-28**: NMFS is assuming that there will be negative effects to steelhead if phosphorus results in algae growth that will then lead to a pH level that will affect steelhead. Yet, these pH levels are elevated above what has been measured and modeled in Icicle Creek. NMFS used rainbow trout as a surrogate for steelhead. The studies cited by NMFS tested adult and embryo rainbow trout at pH levels ranging between 9.5 and 10.5 (McGeer and Eddy 1998; Rahaman-Noronha et al 1996). Without other additional stressors (which have not been identified in this Biological Opinion) these pH levels were not shown to result in mortality or sublethal effect in adults or embryos. These pH levels are not expected to result from the proposed action therefore, adverse effects to salmonids are also not anticipated (Table 1 and 2). Indeed, with regard to the embryo studies, *"NMFS notes that these experiments used high pH levels that are not likely to occur in Icicle Creek, so the applicability of these studies' findings to spring Chinook salmon and steelhead embryos in Icicle Creek is unknown..."*

8. **Page 147, Lines 4-7:** How does NMFS define "less severe effects"? Based on NMFS' analysis, is the current hatchery operation and the discharge of phosphorus resulting in discountable, insignificant or adverse effects to life stages of listed salmonids or their prey?

Table 1. Presentation of Acute studies reported in the Biological Opinion (NMFS 2017) with notes from text.

Species	Life Stage	Endpoint/Effect Measured	Duration	pH	Other factors	Citation
Rainbow Trout	Not Reported in Bio Op	Mortality at high temperature	Not reported in Bio Op	9.0[a]	High temp (21.7 ^{o}C)	Wagner 1997
Rainbow Trout	Not reported in Bio OP	Fish survival	28 days	9.5	Not Reported in Bio Op	Wilkie et al. (1996)
Rainbow Trout	Not Reported in Bio Op	Fish survival	Not Reported in Bio Op	10.5	Not Reported in Bio Op	McGeer and Eddy 1998
Rainbow trout	Not Reported in Bio Op	Mortality in soft water	Not Reported in Bop Op	10.1	$CaCO_3$ at 4 mg/L	Yesakai and Iwama (1992)

[a] Pg 145, Line 6: pH of 9, without other additional stressors, doesn't seem to cause mortality in rainbow trout.

"The pH increase in Icicle Creek during the critical months is not likely to cause salmonid mortality because we have no indications that Icicle Creek has water quality stressors to the extent 18 examined in these studies that would contribute to mortality." Pg 144, Lines 16 -1 8

Table 2. Presentation of Sublethal studies reported in the Biological Opinion (NMFS 2017) with notes from text.

Species	Life Stage	Endpoint/Effect Measured	Duration	pH	Other factors	Citation
Coho	Not reported in Bio Op	Changes in physiological constituents (not specified)	144 days	9.4 and 10.0	Not Reported in Bio Op	McGeer et al (1991)
Many	Not Reported in Bio Op	Reduced ammonia and urea efflux	Not Reported in Bio Op	Severely Alkaline Not Reported in Bio Op	None Reported	Groot et al 1995
Rainbow Trout	Not Reported in Bio Op	Fish adapted to pH although ammonia excretion initially blocked	Within 48 hrs	9.5	None Reported	Wilkie and Wood (1991)
Rainbow Trout	Not Reported In Bio Op	Chloride Ion flux restoration; sodium ion balance reestablished	72 hours	9.5	None Reported	Wilkie et al (1991); Laurent et al 2000
Rainbow Trout	Embryos	Ammonia Excretion reduced	Not Reported in Bio Op	10.0	None Reported	Rahaman-Noronha et al (1996)
Rainbow Trout	Embryos	Gene Expression that regulate ammonia, urea and nitrogen excretion	Not Reported in Bio Op	9.7	None Reported	Sashaw et al 2010

Pg 145, Lines 31- 33: "In addition, these sublethal effects do not prevent the fish from swimming out of unfavorable habitat, thereby reducing the likelihood that the fish will be exposed to a high pH for an extended period of time. Therefore, the sublethal effects of high pH in Icicle Creek (if pH were to ever be so high) on spring Chinook salmon and steelhead are also likely to be short term".

Pg 146, Lines 8-10: "However, NMFS notes that these experiments used high pH levels that are not likely to occur in Icicle Creek, so the applicability of these studies' findings to spring Chinook salmon and steelhead embryos in Icicle Creek is unknown; moreover, the number of embryos that would to be affected is likely to be small, as discussed below".